

Noesis

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EDITOR

Rick Rosner
5139 Balboa Blvd #303
Encino CA 91316-3430
(818) 986-9177

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From the Editor--Robert Dick has sent an angry, sardonic letter, which I enjoyed. So much so, that I'm calling it this month's guest editorial.

LETTER FROM ROBERT HANNON

Dear Rick,

I have received a letter from Chris Langan, threatening to prevent further publication of my writings in *Noesis*. I will appreciate hearing from you in that regard.

Hope all is well with you.

Best regards,

Robert J. Hannon

[Editor's comment: I'd appreciate hearing from Chris Langan verifying the threat and specifying how it would be carried out.]

Sometimes I Feel so Stupid!

By Robert Dick
13 Speer Street, Somerville, NJ 08876

I see by the (A) after my name in Hoecsis #88 that now everyone knows I didn't qualify for the Mega Society via a Hoeflin test, just that infamous "Brand X" we used to hear about in commercials many many years ago. I wonder if I can fool all you super-bright people into thinking I'm just as smart as you are? The truth is, I don't understand black holes and wormholes and general relativity. I'm also a lousy chess player. I also have a terrible memory. One year in graduate school I got an A+ in random processes and my homework was used as the standard for grading the next year. But also in that next year I attended a lecture on Poisson processes. What's a Poisson process? I didn't know. Later it dawned on me that most of that course I aced so well was about--you guessed it--Poisson processes and variations on them. Wow, I Felt So Stupid (IFSS)!

I remember one time reading about Mensa and the "super-intelligent" people in it. The magazine gave a sample qualifying test for Mensa. I couldn't see how to answer the problems. IFSS! Luckily or unluckily the answers were in the back of the magazine. I couldn't see the sense of most of them. Years later a co-worker pointed me to "The World's Hardest IQ Test" published in Omni magazine. That test made sense in a way the Mensa test did not. I aced it and found myself eventually in your illustrious company, fellow Megarians. I wonder how long it'll be till someone finds out how stupid I really am!

I remember programming a computer at a particle-physics lab. The researchers invited me to their weekly meetings so I could get a better understanding of what was going on. Most of it was incomprehensible, but I remember the physicists talking about "the strong force." I gathered that is what holds the nucleus of an atom together. Say what? So that's why protons stick to each other instead of just repelling each other! IFSS! All those years in chemistry and physics classes I just dumbly accepted that protons and neutrons cluster together in nuclei. Then I realized I had never asked "how come?" Furthermore, it must be the case that the strong force does not obey the inverse-square law or it would scrunch everything together. So much for Newtonian physics.

Speaking of physics, do any of you geniuses know how heavier-than-air vehicles fly? The answer was given to us in high school. A wing makes the air above it take a longer path than the air below it. The above-air therefore goes faster than the below-air. This reduces the pressure above and the wing develops lift. Bullshit! The air above travels a longer path, therefore its reduced pressure must be integrated over a longer interval. Work out the calculus. The downward force exactly matches the upward force. I read somewhere years later that this is in fact the case. Lift comes from a subtler phenomenon, just what I didn't follow. Our teachers have been lying to us, friends! Recognizing that we were taught wrong has done me exactly zero good. But knowledge is power. Yeah, sure. Rah rah.

You've heard of idiot savants? I must be a genius dolt. What is easy for me seems hard for normal people AND VICE VERSA! I couldn't understand special relativity in 1974, but I usually illustrated with two railroad trains on parallel tracks zipping by each other at

relativistic speeds. It was all so confusing, IFSS! People's clocks and yardsticks didn't agree. What was the resolution of these paradoxes? The professors didn't seem to know or to care, the bastards! I "learned" in high school that the resolution of paradoxes is the great achievement of scientific or mathematical advances. E.g. infinite-series theory explains the paradox of Achilles and the tortois. So to this day I am a relativity-dummy because I was so angry at those professors. I once told an advanced-physics student about that and he said "Yes, there's a lot of nonsense at the elementary level of relativity, but it all makes sense later on." Fine, except for me there is no later on.

I still feel stupid reading Mr. Hannon's articles. I don't know what's right with them, far less what might be wrong with them. He did once touch on Fourier-transform theory, an area of professional expertise of mine. I caught him! But he wouldn't admit it. To this day he thinks he knows more about it than I do. Bullshit. Pardon my French. Perhaps you smarties can catch other errors of his. It wouldn't surprise me. Mr. Hannon, if you're so much smarter than Einstein, if you are going to lecture the Mega Society on a wide variety of topics, why don't you take a little time out and pass an admissions test for the Mega Society? Prometheus? Triple Nine? Mensa? I dare you.

Excuse me folks, I didn't mean to get so hostile. Incidentally, I think "our" society (I somehow feel maybe I've just fooled you into being in it) should be the "Micro" Society. We're one in a million, right? The proper term for that is micro. The Mensa Society should be the Mega Society once it gets a million members (or does it have that many already?).

I recently wrote a letter to the editor of my local paper claiming that high intelligence is vital for certain jobs, e.g. "rocket scientists." I don't think anyone will listen. High level intelligence tests discriminate against women and "minorities." Therefore there must be things drastically wrong with them. I can write letters till I'm blue in the face and the Powers That Be will carry right on assuming everybody is interchangeable. After all, aren't we all created equal? Read Thomas Sowell on affirmative action if you get a chance. We high-IQ freaks may yet get the last laugh on those who reject us. But we're racist sexist male-chauvinistic pigs for claiming intelligence tests measure something valuable, something besides the ability to pass intelligence tests. Pardon my cynicism.

My favorite subject is finding new insights into the wonderful potential of the teachings of Jesus of Nazareth. Unfortunately, there seems to be even less market for that (I mean interest in, not money for) than for almost anything else I can imagine. Doubledomes aren't supposed to think about things like that. They're supposed to cogitate about black holes, and all the stuff Noesis is in fact now full of. I can't even seem to belong among my intellectual peers, much less society at large. On that depressing note I will stop. Reasoning about numinous matters is extremely difficult. But no one seems to care.

I see I'm venting my spleen, losing track of my theme. Anyway, carry on with the cosmology and relativity. If it makes you happy, do it! All I can say is, it doesn't make ME happy.

TWO GAMES INVENTED BY RICHARD MAY
A game of alternate fours

Start: The gameboard empty; players each use 10 stones of their own color.

Play: White plays first. Players take turns placing one of their stones on any unoccupied vertex of the board, until one player achieves the goal or until all stones are played out. If neither player wins during this placement phase, the game continues into the movement phase.

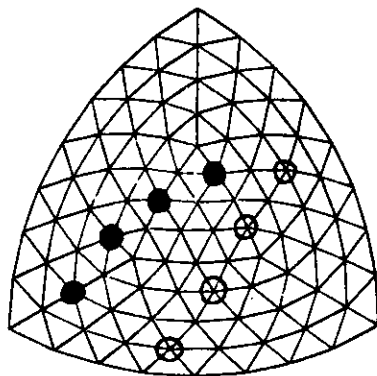
Goal: To form four pieces into either a straight line or a diamond-shaped pattern *on alternate rows*. See diagrams.

Moving: Players take turns moving any one of their stones to an unoccupied point either one or two units distant along an unobstructed line in any of the six directions, until one player wins by attaining the goal.

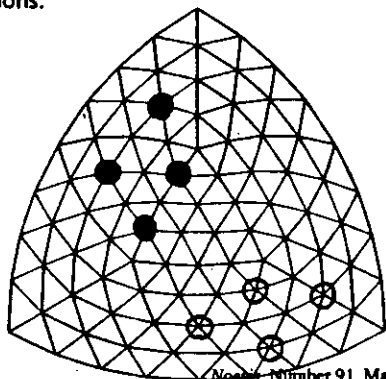
Variations: Players may choose to vary the number of stones in a game to increase the level of difficulty.

Examples of possible winning positions:

Note that a winning figure has its four stones separated by spaces that are either lines or vertices. The winning figure is formed by non-adjacent stones, so spaces between the four stones of a winning figure may be occupied by other stones of either color. Patterns can occur in non-interfering, mutually embedded positions.



*Straight line on alternate rows,
separated by one line or vertex.*



*Diamond pattern with stones separated
by a line or intersection*

ALIENS AND AMAZONS

A strategy game with differing objectives for two players

◀ USES SAME GAMEBOARD AS TETRA ▶

- Start:** One player has 3 white pieces, "Aliens," and the other player has 30 black stones, "Amazons." Empty gameboard.
- Play:** White begins by placing an Alien on any vertex, usually close to the center. An Amazon is next placed on any unoccupied vertex, and then the second Alien on any unoccupied vertex. Then the second Amazon, followed by the third Alien. Another Amazon follows. At this point the Aliens begin moving, and the Amazons continue to be added to the board after each *move* by an Alien, until all 30 Amazons are on the board. Only after all Amazons have been placed on the board may the Amazons be moved. While the Amazons are being placed, some Amazons will be captured and removed from the board by the Aliens.
- Moving:** A stone of either color may move one unit in any of the six directions to any unoccupied point on the board. Amazons may *not* jump over other pieces, either Aliens or Amazons, and may *not* capture Aliens. An Alien may jump an Amazon, if the point immediately on the other side of the Amazon on the same straight line is unoccupied. The Amazon is thereby captured and removed from the board. Multiple jumps and captures of Amazons by an Alien are possible on one turn. Capturing is *not* mandatory. One Alien may jump over another Alien, if the point immediately on the other side is unoccupied, but there is no self-capturing and no removal of Aliens from the board.
- Goals:** The object of the player with the Amazons (Black) is to block and immobilize the three white Aliens, thereby winning the game. The object of the player with the Aliens (White) is to capture a sufficient number of Amazons to eliminate the possibility of being blocked and immobilized, thereby winning the game.

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Replacement parts or additional stones may be ordered from Kadon Enterprises, Inc., Please inquire about prices.

The historic book, *Mudcrack Y and Poly-Y* (NEO Press, 1975) is available in limited quantities from Kadon on a first-come, first-served basis, while supplies last. Each book contains over 1000 gameboards in a variety of designs, as well as much information about how to play well. All you need is two pencils. Please inquire about price and delivery time.

Solutions to solitaires are available. Please send 50 cents and self-addressed stamped envelope to Kadon Enterprises, Inc.

Kadon Enterprises, Inc.
1227 Lorene Drive, Suite 16
Pasadena, MD 21122

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WISDOM SOCIETY BROCHURE

"Our culture is superficial today, and our knowledge dangerous, because we are rich in mechanisms and poor in purposes.

The balance of mind which once came of a warm religious faith is gone: science has taken from us the supernatural basis of our morality and replaced it with disorderly individualism that reflects the chaotic fragmentation of our character.

Without philosophy, without the total vision which unifies purposes, we fritter away our social heritage in cynical corruption on the one hand, and revolutionary madness on the other.

We are being destroyed by our knowledge, which has made us drunk with power.

And we shall not be saved without wisdom."

—Will Durant

"Happy is the man that findeth wisdom for the gain from it is greater than the gain from silver and its profit better than gold. She is more precious than rubies; and all the things thou canst desire are not to be compared to her."

— Proverbs 3:13

For centuries mankind has recognized in some a superior synthesis of experience, knowledge, insight and intuition. Called wisdom, this higher human attribute reflects a soundness of judgment in dealing with the world as it is, as well as a rare understanding of the ultimate nature of reality.

Aristotle is generally credited with being the first to break down this all-inclusive concept into two quite distinct aspects. The first he called "practical wisdom". Coleridge came up with

the apt definition, "*Common sense in an uncommon degree.*"

The second aspect Aristotle saw was of an esoteric or metaphysical nature, dealing with first causes and the meaning of life.

It may seem odd that when we go into a library or book store today, we will find an abundance of books and periodicals dealing with the second aspect -- the metaphysical. They tell us we are in the age of Aquarius, and man is going through an evolutionary change of epic proportions. Naturally, ideas like this are fascinating to many, and as a result, there are all sorts of groups and organizations, some religious, that carry on the study of the occult and the supernatural world. On the other hand, we can find hardly any books or organizations interested in the first aspect of wisdom -- practical wisdom dealing with the here and now. Meeting this need is one reason for starting another organization in a world that already has too many organizations.

Our primary reason for founding The Wisdom Society, however, is that we agree so wholeheartedly with Robert Hutchins when he said:

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"We have to continue to search for knowledge, but we see now that knowledge without wisdom has brought us to the edge of destruction and may at any time push us over the brink."

He said this 30 years ago and ever since we have been getting closer to that brink. But wait, we have a third reason for founding The Wisdom Society. We take great exception with the same Robert Hutchins when he said, "whatever may have been the case in earlier times or in other types of society, the wisdom that a democratic community needs is the wisdom of the entire population." To us, that seems unreasonable.

The world will not wait for everyone or even a majority to gain wisdom. No, we have to make do with the few who are endowed with wisdom in the same way we do with other areas of human competence. We do not all have engineering genius or musical talent, but we gain from those who do. We have designed a social apparatus that identifies those talents and provides for their demonstration and reward. What valid reason is there to believe that we cannot do as much for wisdom?

If we intend to save the world from going over the brink, we need to find a new way to distill the wisdom that is in our society and raise it above the roar and the clamor. We must create a new apparatus to serve the purpose. Such an apparatus is The Wisdom Society which will provide the nucleus and the financing to draw in from all corners any who have faith in wisdom.

As Socrates said, the wise do not consider themselves wise. But, fortunately for mankind, there is a minority that aspires to wisdom. There is a minority that considers wisdom man's highest virtue and most precious attribute. It is this minority that is joining together to form The Wisdom Society.

Not long ago, life was very different. We lived on farms or in villages, completely cut off from the rest of the world: No phones, no radios, no cars and winding, rutted roads. We were generalists. Each self-sufficient with only the blacksmith and the country doctor to help. Changes took place slowly in those days. With men like Washington and Jefferson as guides, wisdom was

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handed down from father to son. No one worried about unemployment or the future of America.

In one lifetime that all has changed. Two explosions have blown our world apart. The knowledge explosion has made us all dependents. No longer are we self-sufficient; we are instead, cogs in an intricate machine that no one knows quite how to run. At the same time, we are battered by a population explosion that overwhelms our "melting pot" and leaves a hundred social problems in its trail.

In these difficult times we would all like to be governed by the wisest and the best, but that is hardly possible. What is possible is to create an unbiased, non-political source of wisdom and a method of bringing that wisdom to bear on the difficult controversial issues of the day.

We can create, as it were, a compass that would point in the direction that wisdom suggests -- a compass like other compasses that we can either follow or ignore. Our Ship of State will still be guided by a partisan congress and a partisan president, but there will also be this compass -- not

partisan, not authoritative, not political, not a part of government -- pointing in the direction wisdom tells us to go.

The Wisdom Society is not a "think tank" nor an activist organization. Our country is blessed with many of these groups now. They supply us with both sides of every issue. Our problem, of course, is deciding which side is right. Being a democracy founded upon the theory that wisdom is derived from collective ignorance, we solve that problem now with a mixture of faith, emotion and catch phrases.

What we are suggesting here is that The Wisdom Society's compass would be a great help in making those decisions. But who would listen to us? You ask. At first, no one. However, if we do our job well, eventually, the great silent majority will listen. Why? Because wisdom is the only thing everyone can believe in.

*"The only medicine for suffering, crime and all other
woes of mankind is wisdom."*

— T. H. Huxley

Our Mission:

To nourish a wider faith in wisdom.

Our Goals:

To be to wisdom what the church is to religion.

To bring together those who have faith in wisdom.

To become a custodian of values.

Our Program:

To debate, in print, all controversial ideas with the objective of finding where reasoned opinion lies.

To establish chapters and discussion groups.

There will be no hierarchy, no power but the power of wisdom and confidence in the proposition that

"Truth will prevail if not deprived of its normal weapons of investigation and debate."

If you have faith in wisdom, come -- join us.

**"COMMON
SENSE
IN AN
UNCOMMON
DEGREE"**

The Wisdom Society

P.O. Box 4126
San Marcos, CA 92069
Phone (619) 931-9834
Fax: (619) 727-9489

THE QUANTUM

Robert J. Hannon
4473 Staghorn Lane
Sarasota FL 34238-5626

In December 1899, Max Planck (1858-1947) presented his Quantum Theory to a meeting of the German Physical Society in Berlin. He told his audience that energy in the form of electromagnetic radiation (EMR) is available only in integral multiples of a specific minimum amount, which he called a "quantum" (from Latin, *quantus* = how much). The amount of energy, E_q , contained in a quantum, according to Planck, is exactly hf , where h is a constant [now called Planck's constant, 6.63×10^{-27} erg-sec] and f is the frequency [in cycles/sec, or Hertz (Hz)] of the waves of the EMR involved.

This was a revolutionary idea. Planck said, in effect, that EMR is composed of "packets" of energy, somewhat analogous to the atoms of matter. Planck's Quantum Theory has become a fundamental concept in our physical sciences, and underlies many other physical theories. It is the fundamental premise of what we now call "quantum mechanics", which is that segment of physics which attempts to describe the behavior of the quantum.

Why and how did Planck come to believe in the existence of the quantum of energy? Did it come to him as a bolt from the blue?

All we can be sure of is that Planck reached his momentous discovery as the result of a great deal of thought and difficult mathematical analysis in his attempts to explain why a rather startling phenomenon predicted by the science of that time had not been observed.

During the late 1890s, Sir James Jeans (1877-1946) attempted to develop an explanation of the spectral distribution of energy of hot bodies as their temperature is increased. As part of his studies, he imagined what would happen to EMR inside a cube (L meters on a side) of an ideal material containing a perfect vacuum, whose inside walls are perfect mirrors which reflect 100% of all radiation falling on them. (Note: it would be impossible to see anything going on inside such a cube. EMR could not penetrate its perfect-mirror inside surfaces.)

This imaginary cube came to be called "Jeans's Cube". The longest wave that can propagate in the cube has a wavelength of $2L$. The shorter waves that can propagate inside the cube have wavelengths $2L/2, 2L/3, 2L/4, 2L/5, 2L/6, 2L/7, \dots, 2L/n$, where $n =$ any integer. Jeans assumed that waves having other than these specific "correct" values will interfere with themselves, and eventually cancel. This means that there are an infinite number of waves of the correct wavelengths that can propagate inside the cube. If EMR of any of the possible correct wavelengths (or any mixture of any or all of them) is introduced into the cube, it will be reflected back and forth with the other forever, and will remain unchanged in its energy and wavelength.

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Then Jeans imagined that a minute speck of matter (a coal dust particle, or a small amount of some gas) is also introduced into his cube, along with the EMR. Then some portion of the energy of the EMR would be absorbed by the atoms/molecules of that matter and re-radiated at some other wavelength. He assumed that any atom or molecule of matter of any kind can absorb energy from EMR of any wavelength and re-radiate that energy as EMR of any other wavelength. Thus, while only one wavelength may have existed in the cube before introduction of the speck of matter, the presence of that speck would eventually lead to the existence of EMR having all possible wavelengths correctly related to L .

Then, drawing an analogy between EMR waves and molecules of a gas, he assumed that the physical law governing the distribution of energy among the molecules of a volume of gas would apply to the distribution of energy among the EMR waves of different lengths that can exist with his cube. He assumed that the Law of Equipartition of Energy, which says that all of the molecules in a given volume of a gas share equally in the distribution of the total available energy, applies to the EMR of different wavelengths within his cube.

This led to a serious problem: The number of molecules in a given volume of any gas is finite, while the number of possible wavelengths of EMR in Jean's cube is infinite. This implies that if the Law of Equipartition of Energy applies to the various possible wavelengths, each wavelength will receive $E/\infty = 0$. This all seems reasonable, if all of Jeans's assumptions are true. The implication is that, while the total energy of all the EMR in the cube will not change, the portion of that energy shared by EMR of each specific wavelength will (eventually) become zero.

It may appear that it all should have stopped at this point, but Jeans wasn't happy with the idea that energy might "self-destruct" in his cube. He went on to conclude that, on the other hand, the sequence of possible wavelengths continues indefinitely in the direction of shorter and shorter wavelengths, and that all of the available energy will be concentrated in the region of infinitely short wavelengths. There is an implication here that Jeans believed that there is a necessary relationship between a wave's energy-content and its wavelength. He may have deduced such a relationship from Wein's Law (The wavelength of maximum intensity is inversely proportional to the temperature of the emitter), and the Stefan-Boltzmann Law (the total intensity of the emitted radiation is proportional to the fourth power of the emitter's temperature). Jeans's logic for this conclusion, in effect, rejected the Law of Equipartition of Energy, which, if actually applicable to the EMR in his cube, says that as the number of existing wavelengths increases toward infinity, the energy allocated to each wavelength will approach zero.

Physicists of his time, including Planck, accepted Jeans's view. What he said, in effect, was that if he injected EMR of only one (correct) wavelength into his cube, along with a speck of matter, that eventually the cube would contain EMR of all possible

(correct) wavelengths: heat, light, ultraviolet light, x-rays, gamma rays, and beyond to infinity....and that all of the EMR energy initially introduced would be concentrated at the shortest wavelengths.

This theoretical situation came to be known as "Jeans's Paradox" or "the ultraviolet catastrophe".

And, as seems to have been the habit of physicists then as it is now, it came to be believed that what theoretically happens in Jeans's entirely hypothetical, idealized cube must also happen to EMR in all practical cases. In other words, Jeans's idealized cube was "generalized" to all real-world situations involving interactions of EMR with matter.

If so, then all situations involving interactions of EMR with matter must eventually result in all of the EMR energy involved becoming concentrated at shorter and shorter wavelengths. Taken literally, Jeans predicted that if one lit a fire, its radiation output must rapidly progress from heat to light to x-rays to gamma rays and beyond.

This phenomenon is never observed in the real world.

Why not?

First of all, it can not actually take place except inside of Jeans's hypothetical cube. If it did happen there, we could not know.

Second, there are some doubtful assumptions involved in Jeans's hypothetical situation, as is indicated by the fact that the eventual results he predicted are not observed in nature. Yet the most astute minds of his time seem to have accepted his logic, and its generalization to real-world situations. Some actively sought to find the reason(s) why "the ultraviolet catastrophe" is not observed in the real world.

In seeking an answer, Planck discovered the quantum of EMR energy.

The Jeans cube contains a fixed total amount of energy. When the speck of matter transforms a portion of that energy at some correct wavelength, such as $2L$, to some other correct wavelength, such as L , it does not alter the total amount of energy in the cube. It occurred to Planck that the energy contained in a wave of wavelength L may be greater than that available from a wave of wavelength $2L$. If that were true, it would be impossible for the molecules contained in the speck of matter to transform the energy of the $2L$ wave into an L wave, or that of an L wave into an $L/2$ wave, etc.

Carrying this logic into the domain of ever smaller values of L and ever smaller values of E , it became apparent to Planck that it might not be possible to transform any one "energy-unit" of any wave into an "energy-unit" of a wave of shorter wavelength. This implies that each possible wavelength has a specific

"energy-unit", that is, a "quantum" of energy.

The amount of energy contained in any quantum (Eq) must be some function of wavelength:

$$(1-1) \quad E_q = F(\lambda)$$

For mathematical reasons, Planck converted wavelength (λ) to frequency (f): $f = c/\lambda$, where c = the speed of propagation of EMR in a vacuum. He concluded that the function that relates Eq with f is a simple transformation factor, which he called h :

$$(1-2) \quad E_q = hf$$

If a quantum of EMR having frequency $F_a (= c/2L)$ were introduced into Jeans's cube, it would be impossible for the speck (or any amount) of matter in the cube to transform the energy of that quantum into a quantum of energy having frequency $F_b (c/L)$, because:

$$\begin{aligned} E_q(F_a) &= h(c/2L) = \text{quantum energy at frequency } a \\ E_q(F_b) &= h(c/L) = \text{quantum energy at frequency } b \end{aligned}$$

and therefore: $E_q(b) = 2E_q(a)$

and therefore the energy contained in the quantum of frequency F_a is only 1/2 of the energy required to produce a single quantum at frequency F_b . This inadequacy will always be true in situations requiring transformation of quanta from a lower to a higher frequency. If 2 quanta were introduced into the cube at frequency F_a , it would be possible for the matter molecules to produce a single quantum at frequency F_b , but it would not be possible for those molecules to go on to produce a single quantum at the next-higher correct frequency $F_c (=3c/2L)$, and so on. Jeans's paradox could (theoretically) happen only if a vast (infinite?) number of quanta were injected into the cube at frequency F_a .

The (theoretical) existence of EMR quanta thus (theoretically) explained why Jeans's paradox ("the ultraviolet catastrophe") is not observed in the real world.

Planck extended his quantum concept into his theories of the radiation of EMR, concluding that EMR at any specific frequency can be produced and emitted only in exact integral multiples of hf , that is:

$$(1-3) \quad E = nE(q) = nhf$$

where n = any integer (1,2,3..... ∞)

We are told that Planck's Quantum Theory has been proven to be true by uncounted experiments.

There are some interpretations of Planck's Quantum Theory that are not necessarily true, however. For example, we are sometimes led to believe that EMR is emitted in "discrete" quanta, implying that

quanta are separate pulses of waves, with finite gaps in between. There is nothing in Planck's theory to support that view. Planck's theory tells us only that:

* it is not possible for energy in the form of EMR to be a fractional multiple of hf .

* the total energy contained in any continuous series of waves of EMR of one fixed frequency must be an integral multiple of hf .

In his THE THEORY OF HEAT RADIATION, Chapter III, Planck makes it clear that an "oscillator" (a mathematical entity that absorbs energy at any frequency and re-emits it at a specific frequency) can not emit EMR energy until it has absorbed enough energy to emit 1, or 2, or 3, or n , times hf . Emission of hf , $2hf$, $3hf$, etc, is "subject to the laws of chance", but emission always takes place at exactly the same time as it has absorbed nhf , and then the oscillator always emits the entire quantity, nhf . Thus it is apparent that an oscillator/emitter can emit a continuous series of any duration of waves of EMR at any specific frequency, provided only that the total energy involved must equal exactly nhf .

Setting aside Planck's ingenious theory, if quanta don't really exist, could Jeans's cube actually produce "the ultraviolet catastrophe"? Perhaps the best answer is "we don't know", because it is impossible for us to construct such a cube and observe the behavior of EMR in its interior.

There are some reasons to believe that "the ultraviolet catastrophe" would not take place. Consider the false assumptions involved:

a) It is not true that only wavelengths $2L/n$ can propagate in the cube. If a continuous train of waves having a total length of just a bit less than $L/2$ were introduced into such a cube, they would propagate without self-interference, regardless of their wavelength. A train of waves of total length between $L/2$ and L would propagate with all possible interference effects, except for complete cancellation.

The Law of Conservation of Energy makes it impossible for the total energy of the waves within the cube to be changed, and in the absence of any matter in the cube, changes to their wavelength are also impossible. Presence of a significant mass of matter in the cube could eventually result in a continuous spectrum of wavelengths, whose relative component-energies would vary with time due to continuously-changing interference effects.

b) It is not true that a minuscule speck of coal dust or a few molecules of gas can absorb EMR energy at any wavelength and re-radiate it as EMR energy at any other wavelength. A solid speck consisting of but a few molecules has a specific radiation spectrum. A substantial number of molecules compacted into a solid mass is required for radiation of a continuous spectrum. Gasses, whether just a few molecules or a vast number, do not

radiate a continuous spectrum, and can not perform the wavelength transformations required.

c) It is not necessarily true that EMR exists at wavelengths shorter than about $10^{(-27)}$ meters. EMR of shorter wavelengths has not yet been observed.

d) A specific amount of EMR energy is initially injected into the cube. While the wavelengths of that energy may be altered by the effects of the matter present within the cube, the total energy can not increase. Thus concentration of the energy at ever-shorter wavelengths can not produce a "catastrophe" in the sense of producing more energy than was originally injected.

e) If the matter present inside the cube could absorb EMR energy at any wavelength and re-radiate it as EMR energy at any other wavelength, the likelihood is very great that most of its re-radiation would be at incorrect wavelengths that could not propagate (in the ordinary sense) within the cube. The case of a), above, would be the sole exception.

f) Most important is that the "generalization" of the situation from the hypothetical, unachievable ideal of Jeans's cube to somehow be equivalent to all real-world situations involving possible interactions of EMR with matter, is not reasonable.

g) Jeans seems to have rejected the Law of Equipartition of Energy because it seemed to lead toward an infinite number of wavelengths each possessing zero energy. It apparently did not occur to him that it would require infinite time for that condition to be reached, or that there may be a natural limit on how short the wavelength of EMR can be.

Why did Jeans and Planck assume that the speck of coal dust would necessarily and always transform a longer wavelength to a shorter?

If Planck's Quantum Theory is correct, it would not prevent a concentration of all energy at the longest possible wavelength. If EMR of wavelength $2L/1000$ were introduced into the Jeans cube, it could, by Jeans's logic, eventually all be concentrated at wavelength $2L$. If one quantum of EMR at wavelength $2L/1000$ were introduced, it would be able to eventually produce 1000 quanta of EMR at wavelength $2L$.

Would this happen in Jeans's cube? We don't know, but this consideration may be the reason why Planck eventually came to consider the quantum of EMR to be the physical reason for the phenomenon of Entropy. Entropy is a rather complex concept and is expressed mathematically in several (equivalent) ways. What entropy means is that in nature energy is transferred only from higher-energy states to lower-energy states. For example, heat is transferred only from bodies of higher temperature to bodies of lower temperature. It is possible to "force" energy to (appear to) flow in the opposite direction, but this can not happen in the most fundamental natural situations.